CERTIFICATE OF MAILING BY FIRST CLASS MAIL (37 CFR 1.8) Applicant(s): Kenneth E. Gall			Docket No. H0004577	
Application No. 10/635,351	Filing Date 8/5/2003	Examiner Edward Lefkowitz	Customer No.	Group Art Unit 2800

Invention: SENSOR SLIP FIT APPARATUS AND METHOD

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Kenneth E. Gall	**EXAMINER:**	Edward Lefkowitz
SERIAL NO.:	10/635,351	**GROUP:**	2800
FILED:	08/05/2003	**ATTY DKT NO.:**	H0004577
TITLED:	**SENSOR SLIP FIT APPARATUS AND METHOD**		

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Commissioner for Patents
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REPLY TO OFFICE ACTION

Dear Sir:

In response to the Office Action dated November 30, 2005 in the above captioned matter, the Applicant is submitting herewith a revised Appeal Brief. The Applicant submits that the Appeal Brief is now in an acceptable condition and requests that Appeal Brief be processed for appeal thereof. The claims submitted in Appendix A represent a clean copy of the claims as previously amended and currently under appeal.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the

undersigned representative to conduct an interview in an effort to expedite the pending appeal in connection with the present application.

Respectfully submitted,

Dated: December 16, 2005

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPELLANTS: Kenneth E. Gall, et al. EXAMINER: Allen, Andre J.

SERIAL NO.: 10/635,351 GROUP: 2855

FILED: 08/05/2003 DOCKET: H0004577

TITLE: SENSOR SLIP FIT APPARATUS AND METHOD

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Kermit Lopez

Kermit Lopez

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APPELLANTS' APPEAL BRIEF UNDER C.F.R. §1.192

I. REAL PARTY IN INTEREST

Kenneth E. Gall and Brian J. Marsh are co-inventors of and also the real parties in interest in the Appellants' invention. Honeywell International Inc. is also a real part in interest in the Appellants' invention as the Assignee of the above-referenced patent application. Kenneth E. Gall and Brian J. Marsh and/or Honeywell International inc. are the "Appellants" entitled to bring forward this appeal.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences related to this appeal and patent application.

III. STATUS OF CLAIMS

The application was originally filed with 20 claims. In the first office action dated December 22, 2004, claims 1-20 were rejected. Appellants responded on December 20, 2004 to the first office action with an amendment in which original claims 1, 10, 11, and 20 were amended. The Examiner entered the amendments submitted in the response/amendment dated December 20, 2004 but then provided a new ground of rejection in the second and final office action dated March 30, 2005. Claims 1-20 were rejected in the second and final office action based on a new ground of rejection. Appellants now appeal from the final rejection to claims 1-20.

IV. STATUS OF AMENDMENTS

Claims 1-20 remain pending in the present application. The final rejection of claims 1-20 is the subject of this appeal.

V. SUMMARY OF INVENTION

The Appellants' invention is generally related to sensing methods and systems. The Appellants' invention is particularly related to pressure sensors. The Appellants' invention is also related to sensor cover and base designs.

Various sensors are known in the pressure sensing arts. In particular, many different techniques have been proposed for sensing the pressure in tires and for delivering this information to the operator at a central location on the vehicle so that he knows that a tire is at low or high air pressure.

Such pressure sensors generally communicate with the vehicle so that the sensed pressure is displayed to the operator when the vehicle is moving, i.e. the wheel rotating relative to the body of the vehicle. Such devices are generally relatively complex and expensive or alternatively are not particularly robust.

Some tire pressure sensor systems incorporate a sensor that is fixed to the body so no rotating electrical contact between the rotating wheel and the chassis is required. In this system, a sensor rod is deflected by contact with the tire sidewall when the sidewall of the tire is deformed as occurs when the tire pressure is low. This system provides an indication of low tire pressure but is not robust. For example mud or other debris on the wheels may cause faulty readings. Furthermore, this system provides an indication only when the tire pressure is reduced significantly as is necessary for significant tire bulge to occur. Clearly such a system simply cannot provide a reading of actual tire pressure.

In another form of fixed sensor the height of the vehicle can be detected and when the height is reduced, it is deemed tire pressure is low. However, if the tire in a rut or is parked on uneven ground, a faulty low-pressure reading is likely to be generated.

More complicated systems are capable of monitoring tire pressure. For example, some pressure sensor systems utilize a rotating encoder formed by a multipolar ring of magnetic segments of different polarity that are distributed circumferentially in a regular and alternating manner. A transmitter coil coaxial with the ring and a fixed pickup (an induction coil system) is energized by alternating electrical current flowing through the transmitter coil to generate a magnetic field superimposed on the magnetic field created by the multipolar ring generates a signal picked up and delivers a signal relating the rotating characteristic of the wheel and thus, the state of the tire.

Some tire pressure systems also utilize a wheel system wherein each sensor on each wheel is provided with a radio transmitter that transmit the information on tire pressure, etc. from the wheel to a radio receiver on the body of the vehicle and this transmitted signal is decoded to provide information on tire pressure etc. and makes it available to the operator. Conventional wireless systems, however, are

not durable and are expensive to design and produce.

SAW pressure sensors, for example, can be composed of a sense element on a base and pressure transducer sensor diaphragm that is part of the cover. For the SAW sensor to function properly, the sensor diaphragm must be in intimate contact with the sense element at all pressure levels and temperatures. To compensate for expansion in the packaging, the sense element and sensor diaphragm must be preloaded when they are assembled to shift the output frequency a known amount, which ensures contact at all times.

In conventional sensor designs, an interference fit between the cover and base can maintain a preload until the cover and base are locked in place by welding, soldering or other connecting means. This type of interference fit can weaken before the parts are locked together and cause the preload to be reduced.

The Appellants have therefore concluded that a need exists for an improved sensor design that reduces or eliminates altogether the need for an interference fit, as indicated above.

It is, therefore, one aspect of the Appellants' invention to provide an improved sensor apparatus and method.

It is another aspect of the Appellants' invention to provide for a sensor apparatus and method for use in tire pressure sensing applications.

It is yet a further aspect of the Appellants' invention to provide slip fit design for a sensor apparatus.

It is an additional aspect of the Appellants' invention to provide a pressure sensor apparatus, which can be utilized as a component of a wireless pressure monitoring system.

In general, Appellants' invention is directed toward a sensor apparatus, and a method of manufacturing the apparatus. A base is generally located proximate to a cover. A sensor element (e.g., quartz, ceramic, silicon, and the like), can be located on the base, such that the cover and the base form a clearance between the cover and the base. The clearance can be configured such that the cover is at a smallest dimension within a tolerance range thereof and the base is at its largest dimension with the tolerance range thereof. Additionally, a pressure transducer sensor diaphragm and a dimple can be incorporated into the cover, wherein the

dimple is in intimate contact with the sensor element at all pressure levels and temperatures thereof.

Thus, instead of using an interference fit between the cover and base, the components thereof are designed to have a clearance between them. Such a design does not rely on an interference between the two parts to maintain preload, but instead can utilize welding, soldering or other connecting means to lock the components in position at the time the cover is assembled to the base. The components can be designed such that when the cover is at its smallest inside dimension with the tolerance range and the base is at its largest outside dimension within the tolerance range there will be clearance between them when they are assembled together.

Appellants' FIGS. 1-9 are included herewith in Appendix B (X). Please refer to Appendix B and FIGS. 1-9 where necessary.

Appellants' FIG. 1 illustrates an exploded view of a sensor apparatus, which can be implemented in accordance with an embodiment of the Appellants' invention.

Appellants' FIG. 2 illustrates a top view of a cover, which can be implemented in accordance with an embodiment of the Appellants' invention.

Appellants' FIG. 3 illustrates a side sectional A-A view of cover depicted in FIG. 2, in which the cover is mounted over a base in accordance with an embodiment of the Appellants' invention.

FIG. 4 illustrates top and side sectional views of a metal base, which can be implemented in accordance with an embodiment of the Appellants' invention.

FIG. 5 illustrates a side sectional A-A view of the metal base depicted in FIG. 4, in accordance with an embodiment of the Appellants' invention.

FIG. 6 illustrates a view of a detail C of the metal base depicted in FIG. 4, in accordance with an embodiment of the Appellants' invention.

FIG. 7 illustrates top and side sectional views of a metal cover, which can be implemented in accordance with an alternative embodiment of the Appellants' invention.

FIG. 8 illustrates a cut-away view of the metal cover depicted in FIG. 7, in accordance with an alternative embodiment of the Appellants' invention.

FIG. 9 illustrates a side sectional view of a sensor apparatus having a base, a cover and a clearance therebetween, which can be implemented in accordance with a preferred embodiment of the Appellants' invention.

The Appellants' invention described herein can be implemented, in accordance with one possible embodiment, as a product in a component in a wireless pressure monitoring system. Such an embodiment can be configured as a small-size device, which is also lightweight and based on battery-less operation. The pressure sensor described herein does not consume power when implemented in the context of a Tire Pressure Monitoring System (TPMS) operation. Thus, the Appellants' invention can be embodied in a practical and low cost design solution. Such a design can be mass-produced for automotive, heavy-duty vehicles, and other commercial markets.

The sensor described herein can be implemented as a pressure sensor that includes a sense element, a package base, and a cover that contains a flexible diaphragm and a dimple. For the sensor to achieve the application accuracy required, the dimple must be in intimate contact with the sense element at all pressure levels and temperatures. To compensate for thermal expansion of the packaging materials (i.e., base and cover), the sense element (e.g., a quartz sense element) and the sensor diaphragm are preferably preloaded when they are assembled, in order to shift the output frequency a known amount to ensure contact at all times.

Note that although the pressure sensor can be implemented as a SAW pressure sensor, it can be appreciated that embodiments of the Appellants' invention can be implemented in the context of a non-SAW sensors. For example, rather than utilizing a quartz sense element, other types of sense elements (e.g., ceramic, silicon and the like) may be utilized in accordance with alternative embodiments of the Appellants' invention.

A dimple can be formed in the center of the pressure sensor diaphragm portion of the cover during its manufacture. The dimple contacts a flat surface on the quartz sense element. In general, the pressure sensor can be embodied as a small, circular element. The design configuration is generally implemented as small, circular, hermetically sealed button package. Example dimensions include

approximately 12 mm in diameter and approximately 2 mm thick. It can be of course be appreciated by those skilled in the art that such dimensions are discussed herein for illustrative purposes only, and are not considered limiting features of the Appellants' invention. Pressure sensor dimensions may vary, depending on the needs and use of such a device.

The design of the cover and base are such that it generally allows for the reduction of assembly tolerances. The sensor material of the base and cover can be formed from stainless steel 17-7 PH. The advantages of such a material are discussed in greater detail herein. The pressure sensor can also be configured in association with an interface design board. For example, a PCB or flex circuit interconnect can be located between the pressure sensor button package and one or more antennas thereof for the transmission and receipt of wireless data.

FIG. 1 illustrates an exploded view of a sensor 100, which can be implemented in accordance with an embodiment of the Appellants' invention. Sensor 100 generally includes a package cover 104 that includes a dimple 102 formed at the center of diaphragm 103. In FIG. 1, the diaphragm area of diaphragm 103 is indicated generally by a circular dashed line. Similarly, dimple 102 is generally indicated also by a circular dashed line. The diaphragm 103 is the flat surface on the top of cover 102.

Sensor 100 also can include a sense element 106, and a package base 108. Sense element 106 can be implemented, for example, as a quartz sense element, a ceramic sense element, a silicon sense element and the like. A SAW chip, for example, can be utilized as sense element 106. Base 108 includes a base portion 120, which is recessed into base 108 and in which the sensor element or sense element 106 can rest.

Cover 104 can be formed from a stainless steel, such as, for example, a stainless steel 17-7 PH material. Cover 104 can be initially formed from a flat sheet stock that is approximately 0.50 mm thick in the annealed condition. The cover can next be stamped into a circular shape, and deep drawn into a cup configuration. Next, dimple 102 can be formed into the center of the diaphragm 103 portion of cover 104, such that dimple 102 is formed approximately 0.6 mm deep into cover 104. It can be of course be appreciated by those skilled in the art that such

dimensions are discussed herein for illustrative purposes only, and are not considered limiting features of the Appellants' invention. The dimensions of cover 104 may vary, depending on the needs and use of such a device.

Base 108 can also be formed from a stainless steel such as a stainless steel 17-7 PH material. Stamping approximately 2 mm thick annealed material into a circular disk can form base 108. Such a disk can be formed so that two small saddles are protruding from base 108 for which the sensor chip (e.g., a sense element 106) will rest. Holes 116 and 118 can thus be punched into base 108 to facilitate glass to metal seals thereof. Hole 116 is associated with pin 112, while hole 118 is associated with pin 114. Pins 112 and 114 can be utilized to make electrical connection through the hermetic seal.

The glass to metal seal process and hardening process can occur simultaneously. The material can be heated to approximately 975 degree centigrade to re-flow the glass and for simultaneous "Austenite Conditioning" (a process well known in the art, which does not need to be described in detail herein) of 17-7 PH stainless steel used for base 108 and cover 104.

So-called "Austenite Conditioning" precipitates a significant amount of chromium carbide and prepares it for complete transformation to a hard martensitic plastic. Stainless steel type 17-7 PH can then be cooled to approximately -100 degree Fahrenheit and held 8 hours for complete transformation to a hard "Martensitic" phase for maximum strength and rigidity of the parts. In this condition, the parts are generally hard, but also brittle. The last process involves gold plating the pins 114 and 112 to facilitate wire bonding and soldering.

Finally, the sensor 100 can be assembled and tested. The sensor assembly sequence generally involves the following steps: die attach, wire bond, cover attach, pre-load, weld, after weld test, stabilization bake, after stabilization bake test, PCB attach and chamber test. Cover 104 and base 108 are thus designed to provide an interference fit so that the pre-load process and hermetic seal process can be controlled with increasingly accuracy and efficiency. The cover to base design of sensor 100 also removes assembly tolerances from the tolerance stack because it features a flange-less design.

FIG. 2 illustrates a top view 200 of cover 104, which can be implemented in

accordance with an embodiment of the Appellants' invention. Note that in FIGS 1, 2 and 3, like parts or elements are generally indicated by identical reference numerals. FIG. 3 illustrates a side sectional A-A view 300 of cover 104 depicted in FIG. 2, in which cover 104 is mounted over base 108, including pins 112 and 114, in accordance with an embodiment of the Appellants' invention. Cover 104 thus generally includes a dimple 102 formed at the center of the diaphragm 103 portion of cover 104. Sense element 106 is depicted in FIG. 3 as located below proximate to dimple 102 and between pins 112 and 114.

FIG. 4 illustrates respective top and side sectional views 400 and 402 of metal base 108, which can be implemented in accordance with an embodiment of the Appellants' invention. FIG. 5 illustrates a side sectional A-A view 500 of the metal base 108 depicted in FIG. 4, in accordance with an embodiment of the Appellants' invention. FIG. 6 illustrates a detail of view C 600 of the metal base 108 based depicted in FIG. 4 in accordance with an embodiment of the Appellants' invention. Note that in FIGS. 1 to 6 herein, like or analogous parts or elements are generally indicated by identical reference numerals.

FIG. 7 illustrates top and side sectional views of cover 104, which can be implemented in accordance with an alternative embodiment of the Appellants' invention. FIG. 8 illustrates a cut-away view 800 of the dimple 102 depicted in FIG. 7, in accordance with an alternative embodiment of the Appellants' invention. Note that in FIGS. 1 to 8 illustrated herein, like or analogous parts or elements are generally indicated by identical reference numerals. Thus, FIG. 7 illustrates a top view 700 of cover 104; including dimple 102 located at the center the diaphragm 103 portion of cover 104. FIG. 7 also depicts a side sectional view 702 of cover 104, including the location of dimple 102 and diaphragm 103 of cover 104. The cut-away view 800 of cover 104 depicted in FIG. 8 provides a close-up view of dimple 102, and diaphragm 103 of cover 104.

The sensor described herein can be utilized to measure pressure and temperature inside a vehicle tire (e.g., a passenger car tire or truck tire). The sensor should preferably possess a low cross sectional area and thickness, and is generally light weight in configuration and compatible with processes used to mold truck tires and passenger car tires. The pressure sensor base and cover materials

preferably have a low-yield strength (e.g., approximately 40,000 psi) in the annealed condition so that the sensor can be fabricated utilizing conventional processes such as machining and forming. The pressure sensor base and cover materials also have a high-yield strength (e.g., approximately 20,000 psi) in the hardened condition so that the sensor possesses an enhanced elastic range and lower deformation in the end application.

The use of a 17-7 PH material as the sensor material for the base and cover is also preferred because the hardening process is also compatible with forming glass to metal seals in the base. The use of a 17-7 PH material for this sensor is an advantage of the Appellants' invention because the hardening process and the glass to metal sealing processes are combined. Another advantage of the Appellants' invention is that it provides enhanced sensor performance over other conventional pressures sensor designs.

Although not shown in FIGS. 1 to 8 herein, it can be appreciated that in a SAW pressure sensor embodiment, a plurality of resonators (e.g., 3 resonators) can be connected in parallel to an antenna positioned within a tire or any other device requiring pressure sensors. Such a SAW pressure sensor embodiment can be interrogated by a short RF pulse at a frequency of approximately 434 MHz, which can excite natural oscillations of the resonators. The oscillations can be re-radiated by the antenna and received by an interrogation unit. Such an interrogation unit can analyze the spectrum of the oscillators, calculate two different frequencies and find the pressure and the temperature of the tire.

Thus, a pressure sensor can be composed of a sense element on a base and pressure transducer sensor diaphragm that is part of the cover. For the sensor to function properly, the sensor diaphragm must be in intimate contact with the sense element at all pressure levels and temperatures. To compensate for expansion in the packaging, the sense element and sensor diaphragm must be preloaded when they are assembled to shift the output frequency a known amount, which ensures contact at al times.

In conventional sensor designs, an interference fit between the cover and base maintains preload until they are locked in place by welding, soldering or other connecting means. This type of interference fit can lessen before the parts are

locked together and cause the preload to be reduced. The design depicted in FIG. 9 below ameliorates this problem.

FIG. 9 illustrates a side sectional view of a sensor apparatus 900 having a base 908, a cover 904 and a clearance 910 and 911 therebetween, which can be implemented in accordance with an alternative, but preferred embodiment of the Appellants' invention. Apparatus 900 is analogous to sensor 100 of FIG. 1 and the various components depicted in FIGS. 1 to 9, the difference being that apparatus 900 includes a clearance 910 and a clearance 911 between cover 904 and base 908. Cover 904 is analogous, for example, to cover 104 of FIG. 9. Base 908 is analogous to base 108 of FIG. 8. Clearances 910 and 911 thus respectively form gaps between cover 904 and base 908.

Apparatus 900 can thus be configured such that the base 908 is located proximate to cover 904. A sensor element 906 is located on the base 908 in a manner that permits clearances 910 and 911 to form between cover 904 and base 908. A sensor diaphragm 903 is incorporated into the cover 904. The cover 904 is located on the base 908 such that the dimple 902 is in intimate contact with the sensor element 910 at all pressure levels and temperatures thereof.

Cover 904 additionally can be configured to include a dimple 902, which is generally analogous to the dimple 102 illustrated in FIG. 1. Note that the particular shape and size of dimple 902 may vary, depending on particular applications. The dimple 902 depicted in FIG. 9 is thus presented for illustrative purposes only and the size and shape thereof are not considered limiting features of the Appellants' invention.

It can be appreciated from FIG. 9, that instead of using an interference fit between the cover and base, the components thereof can be designed to form a clearance or gap between the cover and base. Such a design does not rely on an interference between the two parts to maintain preload, but instead can utilize welding, soldering or other connecting means to lock the components in position at the time the cover is assembled to the base.

The components can be designed such that even if the cover is at its smallest inside dimension within the tolerance range and the base is at its largest outside dimension within the tolerance range there will be clearance between them when

they are assembled together. Thus, a clearance should exist generally between the cover and base even if the cover is at its smallest dimension within the tolerance range and the base is at its largest dimension within the tolerance range. The intent of such a feature is to produce the parts at their nominal dimension.

The embodiments and examples set forth herein are presented to best explain the Appellants' invention and its practical application and to thereby enable those skilled in the art to make and utilize the invention. Those skilled in the art, however, will recognize that the foregoing description and examples have been presented for the purpose of illustration and example only. Other variations and modifications of the Appellants' invention will be apparent to those of skill in the art, and it is the intent of the appended claims that such variations and modifications be covered.

The description as set forth is not intended to be exhaustive or to limit the scope of the invention. Many modifications and variations are possible in light of the above teaching without departing from the scope of the following claims. It is contemplated that the use of the Appellants' invention can involve components having different characteristics. It is intended that the scope of the Appellants' invention be defined by the claims appended hereto, giving full cognizance to equivalents in all respects.

VI. ISSUES

ISSUE #1 - Whether claims 1, 2, and 11 and are anticipated by Hersey (US Patent No. 3,588,395).

ISSUE #2 - Whether claims 3-10, 13-15, 17 and 20 are unpatentable over Hersey (U.S. Patent No. 3,588,395).

VII. GROUPING OF CLAIMS

Two groups of claims are being appealed as follows:

GROUP I CLAIMS:

Group I includes claims 1, 2, 11 and 12. Group I also includes claims 6 and 16. Claims 1 and 11 are independent. Claims 2 and 12 stand or fall with respect to independent claims 1 and 11. Claims 6 and 16 also stand or fall with respect to claims 1 and 11.

Independent claims 1 and 11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Hersey (US Patent No. 3,588,395).

GROUP II CLAIMS:

Group II includes 3-10, 13-15, 17 and 20. Claims 10 and 20 are independent. Claims 3-9 stand or fall with respect to independent claim 1. Claims 13-15 and 17 stand or fall with respect to independent claim 11.

Claims 3-10, 13-15, 17 and 20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Hersey (US Patent No. 3,588,395).

VIII. ARGUMENT

APPLICABLE LEGAL STANDARD - 35 U.S.C. §102

The relevant statute cited in rejecting Appellants' claims is 35 U.S.C. §102, Conditions for patentability; novelty and loss of right to patent. Sections (a) and (e) are the basis of the rejections rendered by the examiner. Under 35 U.S.C. §102, sections (a) and (e) a person is to be entitled to a patent unless:

> (a) - the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or
>
> .....
>
> (e) - a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351 (a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language...

The Commissioner of Patents and Trademarks, acting through examining officials, bears the initial duty of supplying the factual basis supporting a rejection of a patent application, including a rejection based on anticipation. *In re Warner*, 379 F.2d 1011, 154 USPQ 173, 178 (C.C.P.A. 1967), *cert. denied*, 389 U.S. 1057 (1968). The courts have interpreted this initial duty as placing on the Commissioner and the examiner the burden of presenting a *prima facie* case of anticipation. *See In re King*, 801 F.2d 1324, 1327, 231 USPQ 136, 138-39 (Fed. Cir. 1986); *In re Wilder*, 429 F.2d 447, 450, 166 USPQ 545, 548 (C.C.P.A. 1970). As stated by the Board in *In re Skinner*, 2 USPQ 2d 1788, 1788-9 (B.P.A.I. 1986), "[i]t is by now well settled that the burden of establishing a *prima facie* case of anticipation resides with the Patent and Trademark Office."

A general definition of *prima facie* unpatentability is provided at 37 C.F.R. §1.56(b)(2)(ii):

> A *prima facie* case of unpatentability is established when the information *compels a conclusion* that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction <u>consistent with the specification</u>, and before

> any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability. (Emphasis added.)

"Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303, 313 (Fed. Cir. 1983) (citing *Soundscriber Corp. v. United States*, 360 F.2d 954, 960, 148 USPQ 298, 301 (Ct. Cl.), *adopted*, 149 USPQ 640 (Ct. Cl. 1966)), *cert. denied*, 469 U.S. 851 (1984). Thus, to anticipate the Appellants' claims, *Hersey* must disclose each element of the respective claims that they are being recited for. "There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention." *Scripps Clinic & Research Foundation v. Genentech, Inc.*, 927 F.2d 1565, 18 USPQ 2d 1001, 1010 (Fed. Cir. 1991).

To overcome the anticipation rejection, the Appellants need only demonstrate that not all elements of a *prima facie* case of anticipation have been met, *i. e.*, show that *Hersey* fails disclose every element in each of the Appellants' claims associated with the relevant reference used for their rejection. "If the examination at the initial state does not produce a prima face case of unpatentability, then without more the applicant is entitled to grant of the patent." *In re Oetiker*, 977 F.2d 1443, 24 USPQ 2d 1443, 1444 (Fed. Cir. 1992).

APPLICABLE LEGAL STANDARD - 35 U.S.C. §103

The obligation of the Examiner to go forward and produce reasoning and evidence in support of obviousness under 35 U.S.C. §103 is clearly defined at M.P.E.P. §2142:

> The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

M.P.E.P. §2143 sets out the three basic criteria that a patent examiner must satisfy to establish a *prima facie* case of obviousness necessary for establishing a rejection to a claim under 35 U.S.C. §103:

1. some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings;

2. a reasonable expectation of success; and

3. the teaching or suggestion of all the claim limitations by the prior art reference (or references when combined).

It follows that in the absence of such a *prima facie* showing of obviousness under 35 U.S.C. §103 by the examiner (assuming there are no objections or other grounds for rejection), an applicant is entitled to grant of a patent. *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443 (Fed. Cir. 1992).

Thus, in order to support an obviousness rejection under 35 U.S.C. §103, the Examiner is obliged to produce evidence compelling a conclusion that <u>each</u> of the three aforementioned basic criteria has been met. If the examiner fails to produce such a conclusion for each of the aforementioned criteria, the rejection must be withdrawn.

APPELLANTS ARGUMENT REGARDING ISSUE #1 - CONSOLIDATED ARGUMENT IN SUPPORT OF PATENTABILITY OF Group I claims:

Claims 1, 2, 6, 11, 12, and 16 (Group I) are not unpatentable over Hersey.

Independent claim 1 and 11 are separate and stand or fall apart from each other.

Claims 1, 2, 6, 11, 12, and 16 as amended on December 20, 2004, and entered by the USPTO, read as follows:

1. A sensor apparatus, said apparatus comprising:

a *base* located proximate to a *cover*;

a *sensor element* located on said *base*, wherein said cover and said base form a *clearance* between said cover and said base; and

a *sensor diaphragm* and a *dimple* formed from and incorporated inwardly into said cover, wherein said dimple is in intimate contact with said sensor element at all *pressure* levels and *temperatures* thereof.

2. The apparatus of claim 1 wherein said sensor diaphragm comprises a pressure transducer sensor diaphragm.

6. The apparatus of claim 1 wherein said sensor apparatus comprises a pressure sensor.

11. A method for forming a sensor, said method comprising the steps of:

locating a base proximate to a cover;

positioning a sensor element on said base;

forming a clearance between said cover and said base; and

incorporating a sensor diaphragm and a dimple into said cover, wherein said dimple is formed inwardly into said cover and is in intimate contact with said sensor element at all pressure levels and temperatures thereof.

12. The method of claim 11 wherein said sensor diaphragm comprises a pressure transducer sensor diaphragm.

16. The method of claim 11 wherein said sensor apparatus comprises a pressure sensor.

In rejecting claims 1, 2, 11, and 12, The Examiner argued that Hersey discloses a base located proximate to a cover (citing reference numeral 13 of Hersey), a sensor element (citing reference numerals 33, 40 of Hersey) located on the base (citing reference numerals 14, 26 of Hersey), wherein the cover (citing reference numeral 13 of Hersey) and the base (citing reference numerals 14, 26 of Hersey) form a clearance between the cover and he base (citing Fig. 1 of Hersey); and a sensor diaphragm (citing reference numeral 51 of Hersey) and a dimple (citing reference numeral 54 of Hersey) formed from and incorporated inwardly into the cover (citing reference numeral 13 of Hersey), wherein the dimple is in intimate contact with the sensor element (citing Fig. 1 of Hersey), wherein the dimple is in intimate contact with the sensor element (citing Fig. 1 of Hersey) at all pressure levels and temperatures thereof.

The Appellant's respectfully disagree with this assessment. The Examiner cited reference numeral 13 of Hersey, arguing that reference numeral 13 of Hersey refers to a cover as disclosed by Applicants' invention. Reference numeral 13 of Hersey refers to a "collar 13" and not a cover. As indicated at col. 1, lines 70-75 of Hersey, the collar 13 has annular coaxial recessed portions of progressively larger diameters that provide a circular fluid chamber 22. Additionally, a review of FIG. 1 of Hersey clearly demonstrates that collar 13 does not function as a cover but instead acts as a ring or band that surrounds the cap 14, rather than functioning as a cover feature with respect to a base. Note that the word "cover" implies a feature that completely covers another feature, whereas a collar is a device that contains a gap in order surround another feature, thereby lacking the criticality of a "cover".

The Examiner also cited reference numerals 33 and 40 of Hersey, arguing that reference numerals 33 and 40 refer to a sensor element as taught by Appellants' invention. Reference numeral 33 of Hersey instead refers to a switch arm and reference numeral 40 refers to a plunger. For example, col. 2, lines 13-22 of Hersey discusses the snap movements of plunger 40 and the use of switch arm 33 as adapted to deflect a contact member 36. Clearly, a plunger 40 and a switch arm 33 is not a sensor element as taught by Appellants' invention. It is difficult to determine how plunger 40 and 33 together constitute a single sensor element as taught by Applicants' invention.

The Examiner also cited reference numerals 14, 26 of Hersey, arguing that reference numerals 14, 26 anticipates a "base" as taught by Appellants' invention. Instead reference numeral 14 of Hersey refers not to a base but to a cap and reference numeral 26 of Hersey refers to a sloping annular shoulder 26. Neither one of these elements either alone or together constitutes a base as taught by Appellants' invention. It is unclear how a sloping annular shoulder 26 and/or a cap 14 constitutes a "base" as taught by Appellants' specification and claims.

Regarding reference numeral 51 of Hersey cited by the Examiner, the Appellants note that reference numeral 51 does not refer to a "sensor diaphragm" but only refers to a "diaphragm 51". This is a subtle, but important difference between Appellants' invention and that of Hersey. The Examiner has not cited any sections of Hersey which teach a "sensor diaphragm' as taught by Applicants' invention.

Regarding reference numeral 54 of Hersey cited by the Examiner, the Appellants' note that reference numeral 54 refers to one of two coaxial annular corrugations, which are essentially co-centric ditches or troughs (see FIGS. 1-2 of Hersey) rather than a dimple as taught by Applicants' invention. A comparison of Appellants' clearly shows the use of a dimple rather than two coaxial annular corrugations. Additionally, Appellants' teach a dimple that is formed inward into a single cover. As indicated above, Hersey does not teach a cover as argued by the Examiner.

Note that in order for Appellants' sensor to function properly, the sensor diaphragm must be in intimate contact with the sense element at <u>all</u> pressure levels and temperatures. There is not a teaching of intimate contact at all pressure levels and temperatures in Hersey. To compensate for expansion in the packaging as Appellants' specification indicates, the sense element and sensor diaphragm must be preloaded when they are assembled to shift the output frequency a known amount, which ensures contact at al times. Such features are not taught, disclosed or suggested by Hersey. The Examiner has not provided evidence to the contrary based on the Hersey reference.

The Examiner also argues that the two coaxial annular corrugations (which are not "a dimple") is intimate contact with a sensor element at all pressure levels

and temperatures thereof. A review of Hersey will find no reference to at "<u>all</u> *pressure levels* <u>and</u> *temperatures* thereof". There is <u>no</u> language in Hersey that supports these features. The Examiner has <u>not</u> cited language of Hersey, which teaches otherwise, particularly in light of the fact that the aforementioned reference numerals of Hersey cited by the Examiner do not function as argued by the Examiner.

Regarding claims 2 and 12, the Examiner argued that Hersey discloses a pressure transducer sensor diaphragm (citing reference numeral 51 of Hersey). The Appellants' respectfully disagree with this assessment. As indicated above, reference numeral 51 of Hersey does not refer to a *sensor diaphragm*, but simply to a diaphragm. Additionally, Hersey does not disclose or teach a "pressure transducer". A *transducer* is a device or component that converts an input signal of one form to an output signal of another form. The Examiner has not identified any section of Hersey which teaches a *pressure transducer* and particularly a pressure transducer functioning in the context of a sensor diaphragm.

Regarding claims 6 and 16, the Examiner argued that Hersey teaches a pressure sensor (citing reference numeral 10 of Hersey). The Appellants' submit that as indicated above, Hersey does not teach all of the claim limitations and elements of Appellants' claims. Thus, a broad reference to reference numeral 10 is irrelevant in light of the lack of the teaching of all of the claim limitations of Appellants' claims.

The Appellants notes that the prior art reference should not be taken out of context, in effect producing the words of the claims (and sometimes, not even the words or concepts of the claims), without their meaning or context. The rejection under 35 U.S.C. 102(b) has provided no more of an explanation than simply to point out the individual words of the Appellants' claims among the Hersey reference, but without the reason and result as provided in the Applicants' claims and specification, and without reason as to why and how the references could anticipate the Applicants' invention as claimed.

Based on the foregoing, the Appellants submit that the rejection to the claims belonging to GROUP I under 35 U.S.C. § 102(B) based on *Hersey* fails to meet <u>all</u> the elements of a *prima facie* case of anticipation. First, *Hersey* does not disclose

each element of any one of Appellants' independent claims 1 and 11 as defined and supported by Appellants' specification. A person of ordinary skill in the field of the invention would see the above-identified differences between the claimed invention and *Hersey*.

For the foregoing reasons, independent claims 1 and 11 and the respective claims that depend there from should have been allowed by the examiner. Appellants now pray for reversal of the examiner and instruction to allow the rejected claims. Appellants therefore respectfully request reversal of the rejection to the claims belonging to Group I.

APPELLANTS ARGUMENT REGARDING ISSUE #2 - CONSOLIDATED ARGUMENT IN SUPPORT OF PATENTABILITY OF Group II claims:

Claims 3-10, 13-15, 17 and 20 (Group II) are not unpatentable over Hersey.

Claims 3-10, 13-15, 17 and 20 as amended on December 20, 2004, and entered by the USPTO, read as follows:

3. The apparatus of claim 1 wherein said sensor element comprises quartz.

4. The apparatus of claim 1 wherein said sensor element comprises ceramic.

5. The apparatus of claim 1 wherein said sensor element comprises silicon.

6. The apparatus of claim 1 wherein said sensor apparatus comprises a pressure sensor.

7. The apparatus of claim 6 wherein said pressure sensor comprises a surface acoustic wave (SAW) pressure sensor.

8. The apparatus of claim 1 wherein said cover is soldered to said base when said cover is assembled to said base.

9. The apparatus of claim 1 wherein said cover is welded to said base when said cover is assembled to said base.

10. A surface acoustic wave (SAW) pressure sensor apparatus, said apparatus comprising:

a base located proximate to a cover;

a SAW sensor element comprising a sense element located on said base, wherein said cover and said base form a clearance between said cover and said base; and

a pressure transducer sensor diaphragm incorporated inwardly into said cover, wherein said pressure transducer sensor diaphragm contains a dimple that is also incorporated into said cover, wherein said dimple is in intimate contact with said SAW sensor element at all pressure levels and temperatures thereof.

13. The method of claim 11 wherein said sensor element comprises quartz.

14. The method of claim 11 wherein said sensor element comprises ceramic.

15. The method of claim 11 wherein said sensor element comprises silicon.

17. The method of claim 16 wherein said pressure sensor comprises a surface acoustic wave (SAW) pressure sensor.

20. A method for forming a surface acoustic wave (SAW) pressure sensor apparatus, said method comprising the steps of:

> locating a base proximate to a cover;
>
> positioning a SAW sensor element comprising a sense element on said base, wherein said cover and said base form a clearance between said cover and said base; and
>
> incorporating a pressure transducer sensor diaphragm into said cover, wherein said pressure transducer sensor diaphragm contains a dimple that is inwardly incorporated into said cover, wherein said dimple is in intimate contact with said SAW sensor element at all pressure levels and temperatures thereof.

In rejecting claims 3-5, 7, 10 13-15, 17 and 20 under 35 U.S.C 103, the Examiner argued that Hersey teaches all the basic features of the claimed limitation, but admitted that Hersey does not teach using quartz, ceramic, or a SAW type sensor element. The Examiner argued that lacking any criticality it would have been obvious to one having ordinary skill in the art of pressure transducers at the time the invention was made to modify Hersey with ceramic or quartz since it has been held to be within the general skill of a worker in the art to select a material on the basis of its suitability and intended use. The Examiner argued that in this particular case it would have been obvious to select the most feasible material readily available to the manufacturer without undue experimentation and trial/error for the purposes of creating a pressure transducer that operates at optimum performance for the desired application.

With respect to the implementation of SAW sensors, the Examiner "took official notice" of the sue of SAW sensors, asserting that SAW type sensors of notorious character in the pressure sensing art.

In rejecting claims 8, 9, 18, and 19 under 35 U.S.C. 103, the Examiner admitted that Hersey does not explicitly disclose how the cover and the base are bonded (welded or soldered), but argued that lacking any criticality it would have been obvious to one having ordinary skill in the art of manufacturing pressure sensors to use the most feasible bonding technique readily available to the users through undue experimentation for the purpose of mating elements together.

The Appellants respectfully disagree with the foregoing assessment and submit that the arguments presented above against the rejection to the GROUP I claims apply equally to the GROUP II claims. That is, as indicated above, with respect to the GROUP I claims, the Examiner has failed to identify how every claim limitation of Appellants' claims are taught by Hersey, thus failing to satisfy the requirements of the third prong of the aforementioned prima facie obviousness test described earlier. That is, Hersey does not provide for the teaching of suggestion of all the claim limitations of the GROUP I claims, including claims 1 and 11, from which claims 3-9 and claims 13-15, 17 respectively depend. A similar argument applies to the rejection to independent claims 10 and 20.

The Examiner has also failed to explain how a reasonable expectation of success would result from a modification of Hersey to result in all of the claim limitations of Appellants' claims 3-10, 13-15, 17 and 20, thereby failing to meet the second prong of the aforementioned prima facie obviousness test. Instead, the Examiner merely states that lacking any criticality it would have been obvious to one having ordinary skill in the art of pressure transducers at the time the invention was made to modify Hersey with ceramic or quartz since it has been held to be within the general skill of a worker in the art to select a material on the basis of its suitability and intended use. The Appellants ask, how Hersey could be modified to include ceramic or quartz, since Hersey does not teach all of the claim limitations of Appellants' claims. Additionally, it is believe that the use of ceramic or quartz in Hersey would result in damage to ceramic or quartz due to the fact that Hersey relies on plunger 40 and switch arm 33 components whose activation would tend to damage delicate material such as ceramic or quartz. The same argument applies to the use of a SAW component, which is also a delicate component.

Finally, the Examiner has failed to satisfy the first prong of the aforementioned prima facie obviousness test. That is, the Examiner has not identified some suggestion or motivation, either in the Hersey reference itself or I the knowledge generally available to one of ordinary skill in the art, to modify the Hersey reference to derive all of the features and elements of Appellants' claims, particularly in light of the fact that the Hersey teaches away from the use of delicate

components such as SAW, ceramic or quartz due to its dated use of non-delicate components such as plungers and switch arms.

The Examiner has not provided a sufficient reason for explaining why one skilled in the art would have been motivated to design a device that includes all of the features taught by Applicants claims and specification. The Applicants remind the Examiner that the references may not be taken out of context and without motivation, in effect producing the words of the claims (and sometimes, not even the words or concepts of the claims), without their meaning or context. The resultant modification as suggested by the Examiner based on Hersey would not yield the invention as claimed. The claims are rejected under 35 U.S.C. 103 and no showing has been made to provide the motivation as to why one of skill in the art would be motivated to make such a modification, and further fails to provide the teachings necessary to fill the gaps in the Hersey reference in order to yield the invention as claimed.

The rejection under 35 U.S.C. 103 has provided no more motivation than simply to point out the individual words of the Appellants' claims among the Hersey reference, but without the reason and result as provided in the Appellants' claims and specification, and without reason as to why and how the references could provide the Appellants' invention as claimed. Hindsight cannot be the basis for motivation, which is not sufficient to meet the burden of sustaining a 35 U.S.C. 103 rejection.

Based on the foregoing arguments, Appellants submit that claims 3-10, 13-15 and 17 and 20 of Appellants' invention are not taught or suggested by Hersey. Modifying the Hersey reference as argued by the Examiner fails to teach or yield all of Appellants' claim limitations. Further, one of skill in the art would not be motivated to make such a modification. Therefore, the present invention is not obvious in light of Hersey. Withdrawal of the §103 rejections is therefore respectfully requested.

SUMMARY OF ARGUMENTS AND CONCLUSION

The following Appendix A (IX) provides a listing of the appealed claims. Appendix B (X) provides renderings of the Figures originally presented in Appellants' patent application.

The appealed claims are not taught, suggested or anticipated by Hersey.

Appellants respectfully submit that their arguments as well as the specification and prosecution record support that claims 1-20 are allowable.

The independent claims of the appealed application are also not anticipated by Hersey. Appellants now respectfully request that the Board reverse the rejections of claims 1-20 and instruct the Examiner to allow one or more or all of claims 1-20.

Respectfully submitted,

Dated: December 16, 2005

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IX. APPENDIX A

CLAIMS UNDER APPEAL

1. A sensor apparatus, said apparatus comprising:

a base located proximate to a cover;

a sensor element located on said base, wherein said cover and said base form a clearance between said cover and said base; and

a sensor diaphragm and a dimple formed from and incorporated inwardly into said cover, wherein said dimple is in intimate contact with said sensor element at all pressure levels and temperatures thereof.

2. The apparatus of claim 1 wherein said sensor diaphragm comprises a pressure transducer sensor diaphragm.

3. The apparatus of claim 1 wherein said sensor element comprises quartz.

4. The apparatus of claim 1 wherein said sensor element comprises ceramic.

5. The apparatus of claim 1 wherein said sensor element comprises silicon.

6. The apparatus of claim 1 wherein said sensor apparatus comprises a pressure sensor.

7. The apparatus of claim 6 wherein said pressure sensor comprises a surface acoustic wave (SAW) pressure sensor.

8. The apparatus of claim 1 wherein said cover is soldered to said base when said cover is assembled to said base.

9. The apparatus of claim 1 wherein said cover is welded to said base when said cover is assembled to said base.

10. A surface acoustic wave (SAW) pressure sensor apparatus, said apparatus comprising:

a base located proximate to a cover;

a SAW sensor element comprising a sense element located on said base, wherein said cover and said base form a clearance between said cover and said base; and

a pressure transducer sensor diaphragm incorporated inwardly into said cover, wherein said pressure transducer sensor diaphragm contains a dimple that is also incorporated into said cover, wherein said dimple is in intimate contact with said SAW sensor element at all pressure levels and temperatures thereof.

11. A method for forming a sensor, said method comprising the steps of:

locating a base proximate to a cover;

positioning a sensor element on said base;

forming a clearance between said cover and said base; and

incorporating a sensor diaphragm and a dimple into said cover, wherein said dimple is formed inwardly into said cover and is in intimate contact with said sensor element at all pressure levels and temperatures thereof.

12. The method of claim 11 wherein said sensor diaphragm comprises a pressure transducer sensor diaphragm.

13. The method of claim 11 wherein said sensor element comprises quartz.

14. The method of claim 11 wherein said sensor element comprises ceramic.

15. The method of claim 11 wherein said sensor element comprises silicon.

16. The method of claim 11 wherein said sensor apparatus comprises a pressure sensor.

17. The method of claim 16 wherein said pressure sensor comprises a surface acoustic wave (SAW) pressure sensor.

18. The method of claim 11 further comprising the step of soldering said cover to said base when said cover is assembled to said base.

19. The method of claim 11 further comprising the step of welding said cover to said base when said cover is assembled to said base.

20. A method for forming a surface acoustic wave (SAW) pressure sensor apparatus, said method comprising the steps of:

locating a base proximate to a cover;

positioning a SAW sensor element comprising a sense element on said base, wherein said cover and said base form a clearance between said cover and said base; and

incorporating a pressure transducer sensor diaphragm into said cover, wherein said pressure transducer sensor diaphragm contains a dimple that is inwardly incorporated into said cover, wherein said dimple is in intimate contact with said SAW sensor element at all pressure levels and temperatures thereof.

X. APPENDIX B

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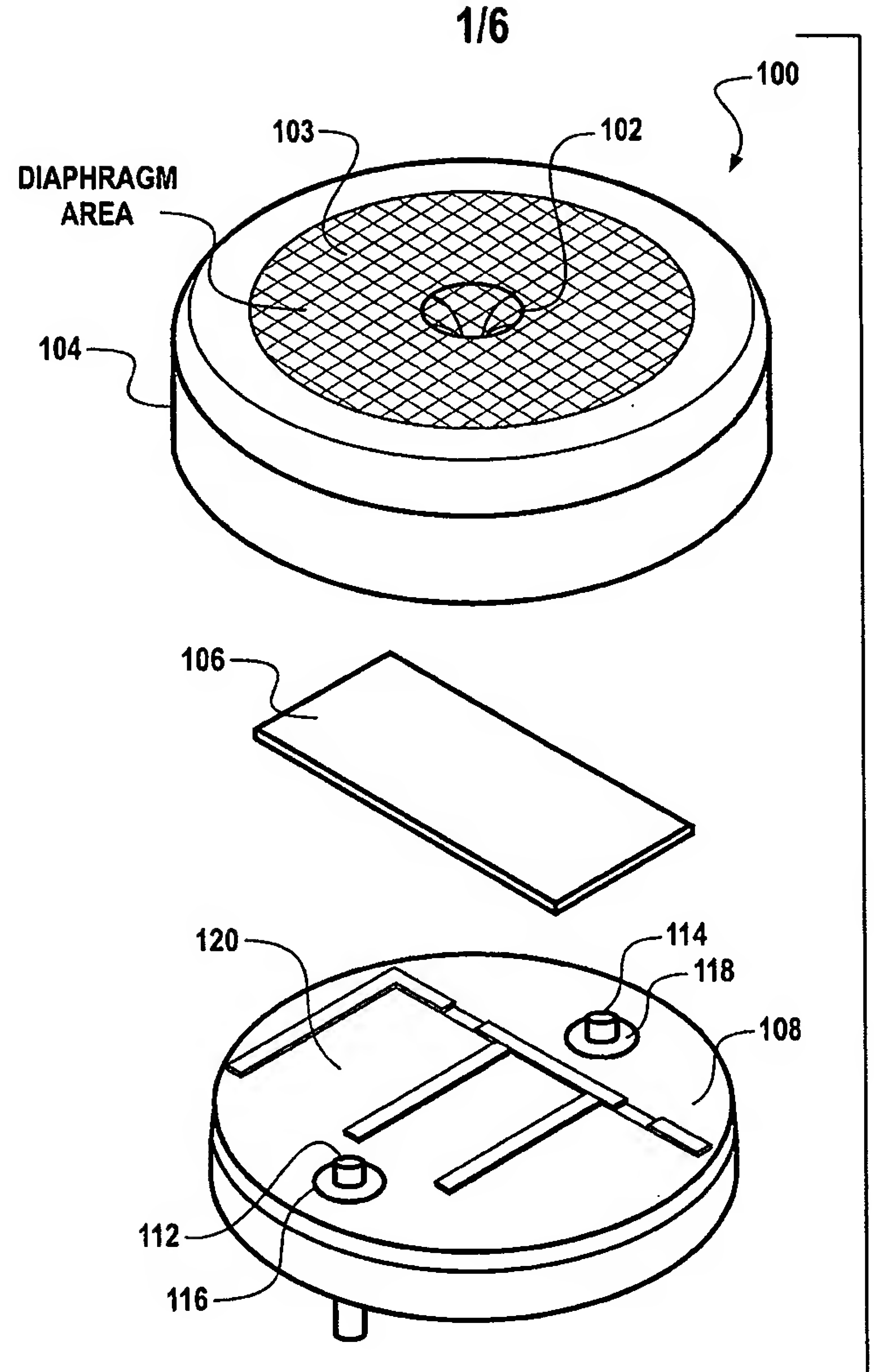


Fig. 1

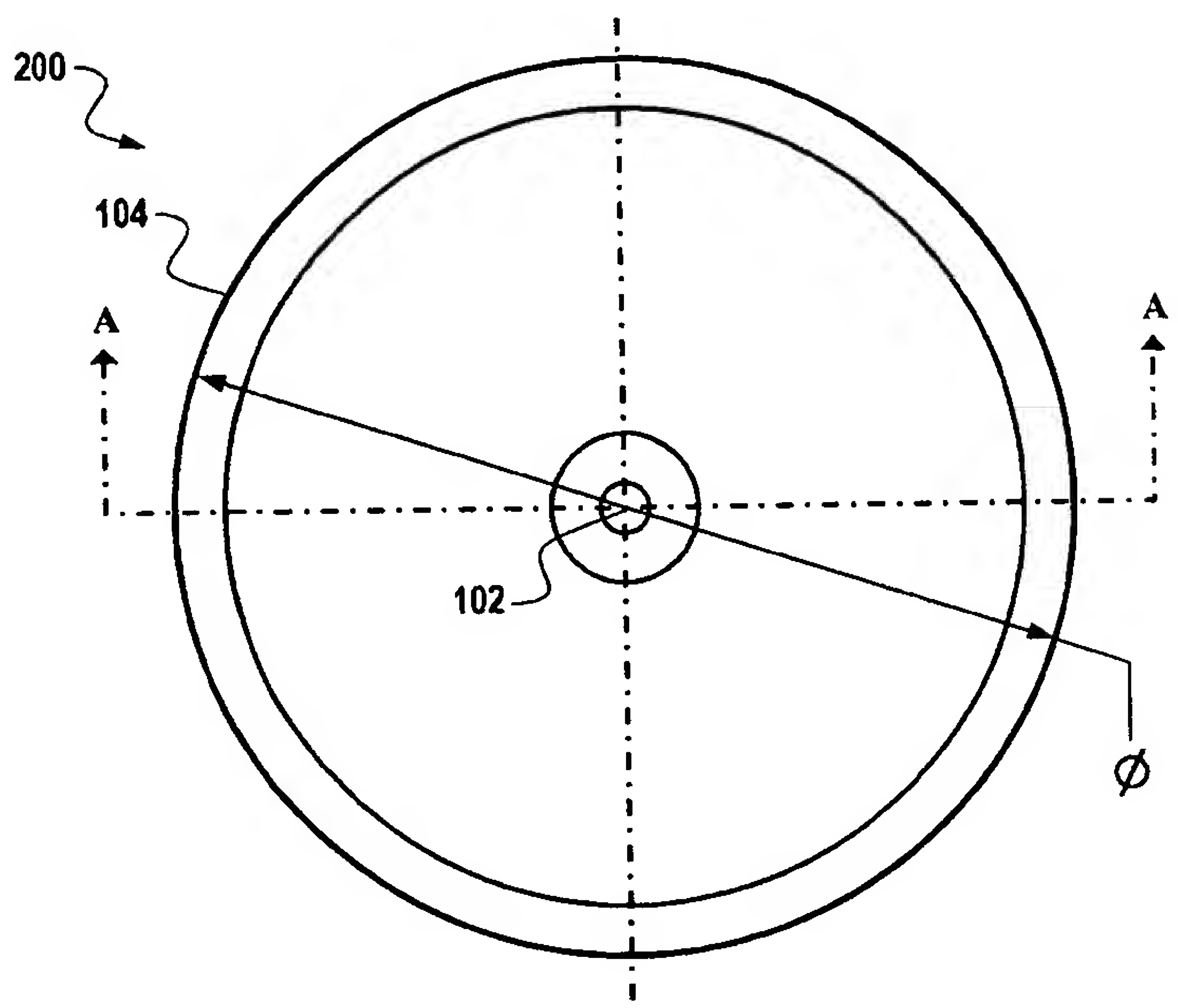
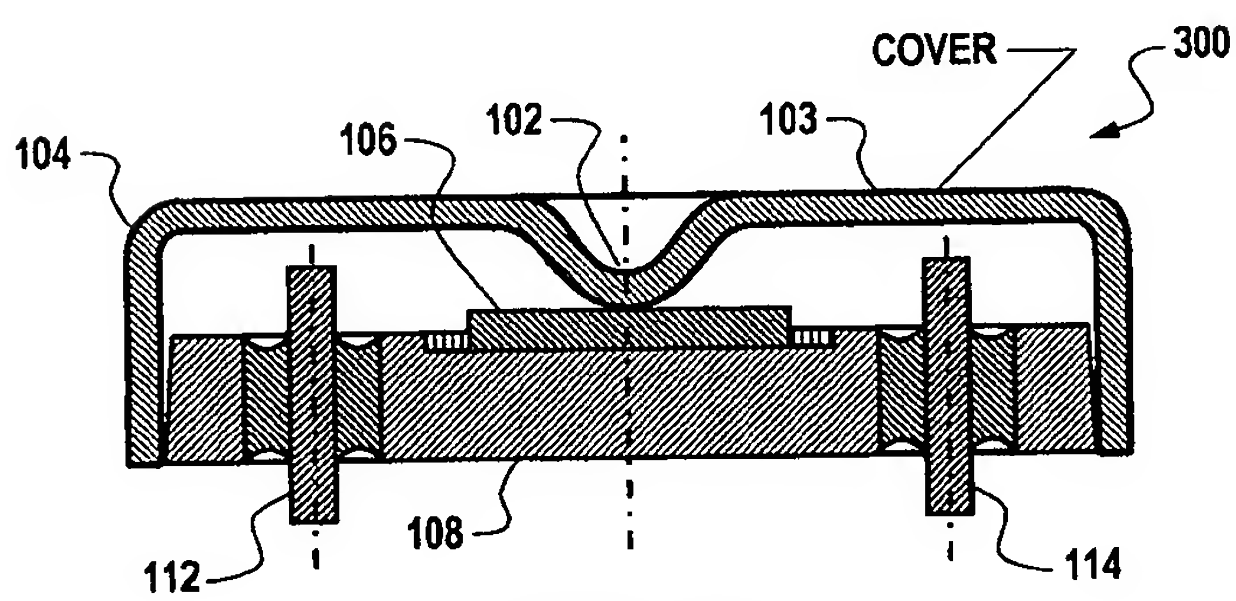


Fig. 2



(Section A-A)

Fig. 3

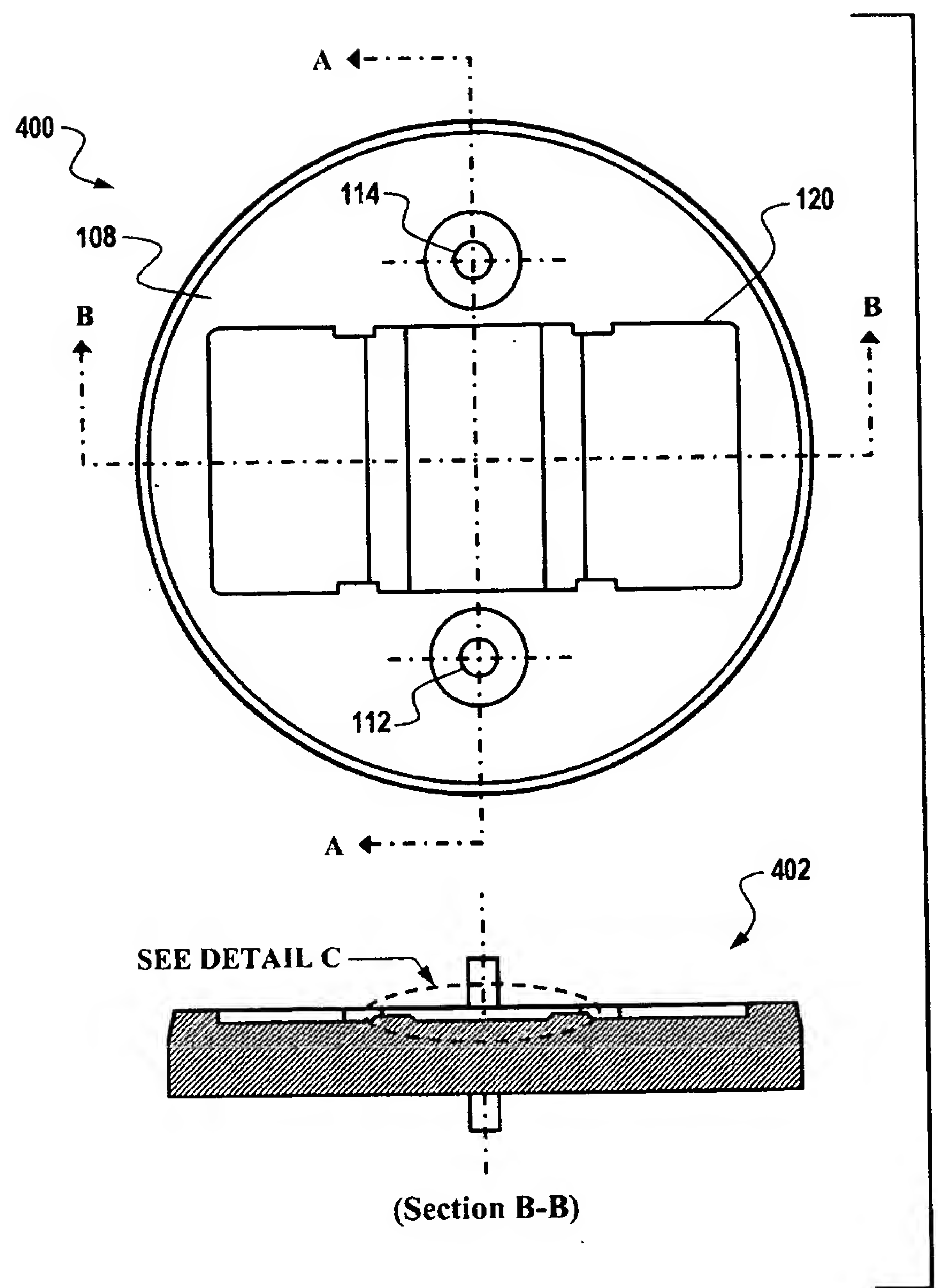
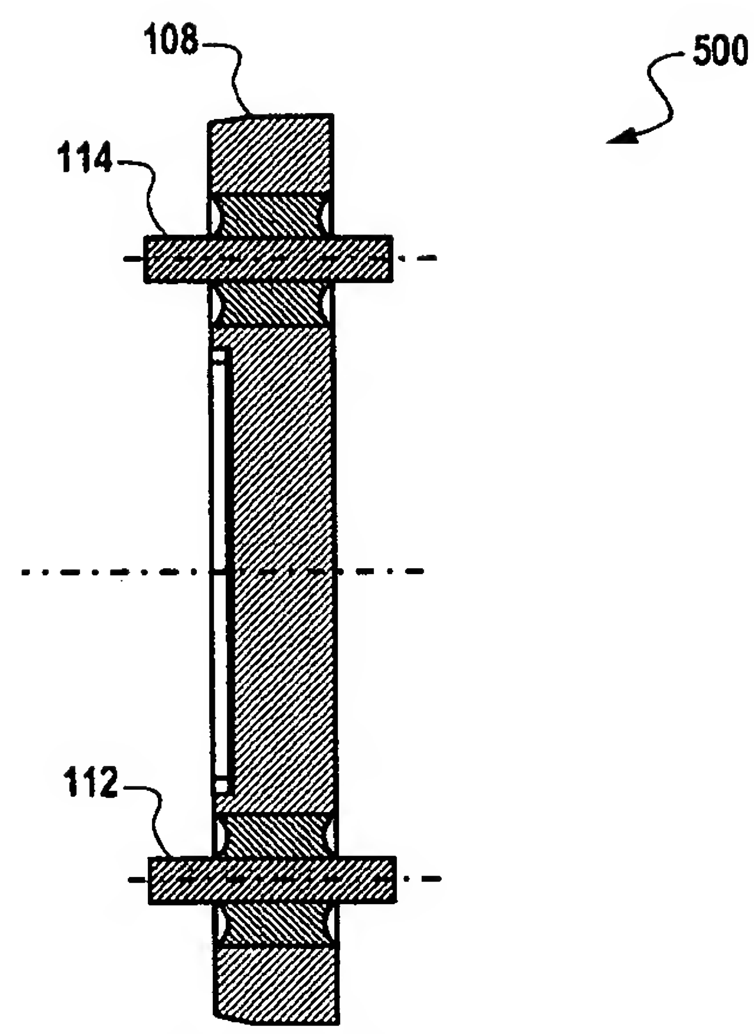
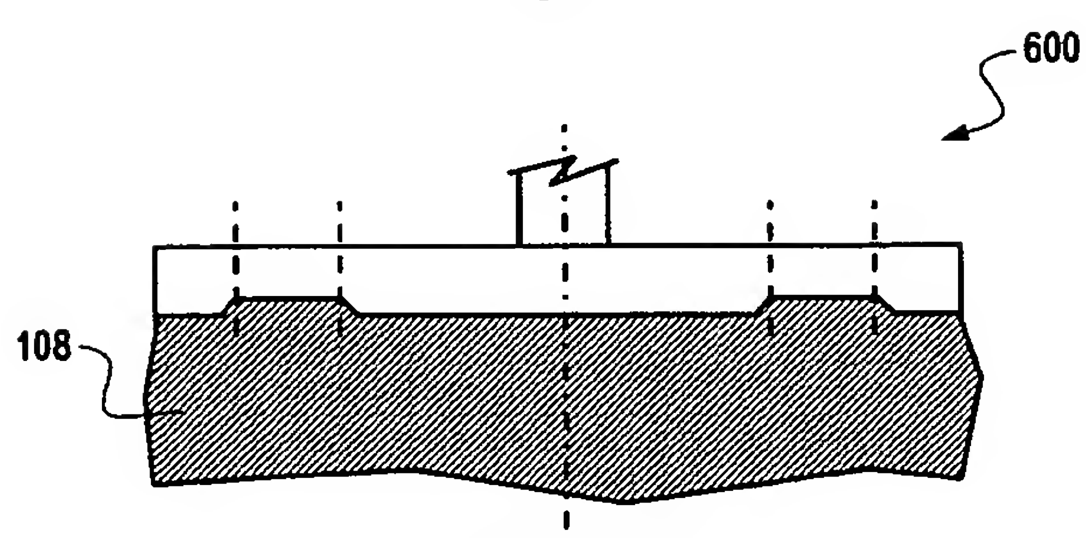


Fig. 4



(Section A-A)

Fig. 5



(DETAIL C)

Fig. 6

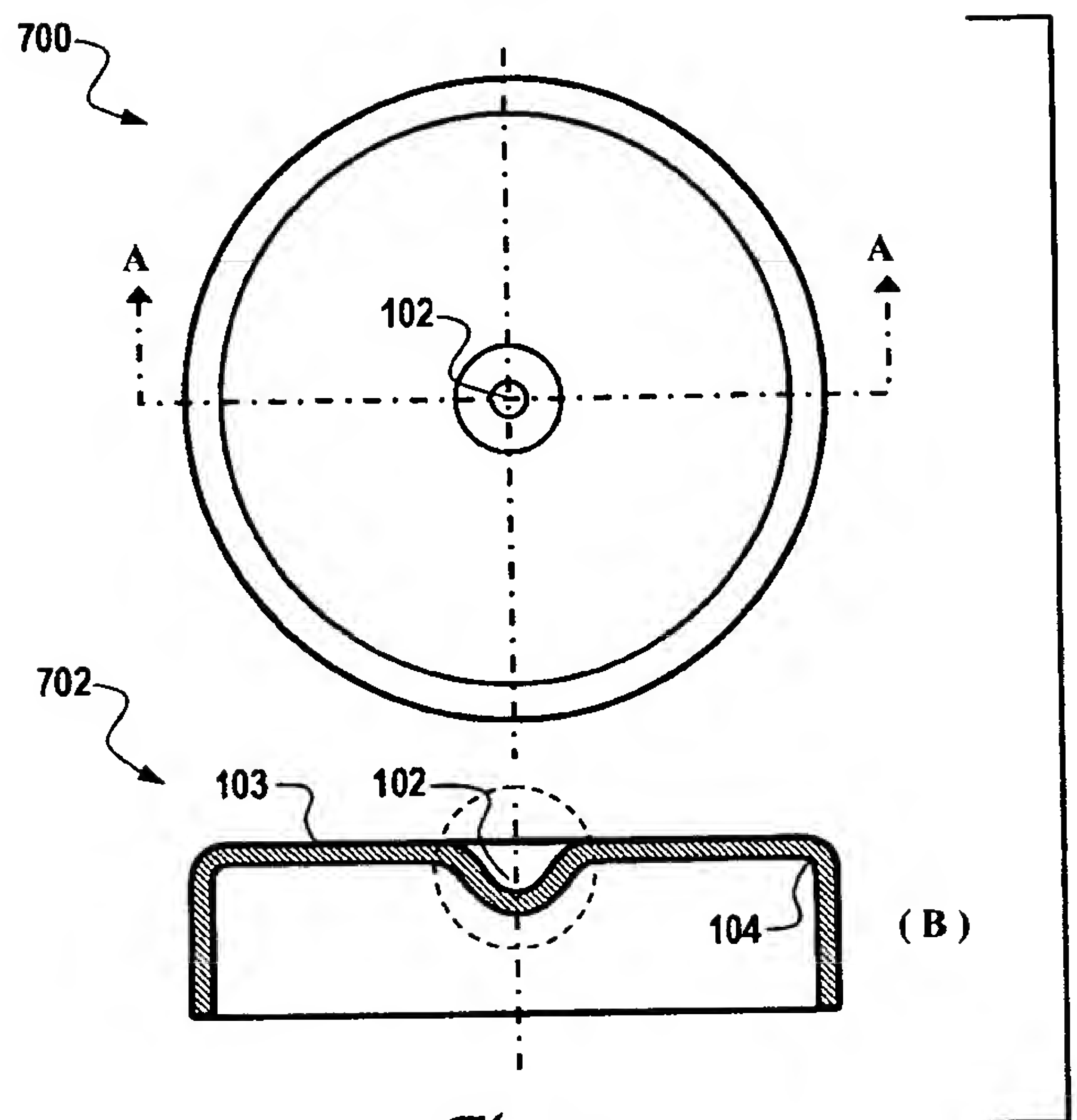


Fig. 7

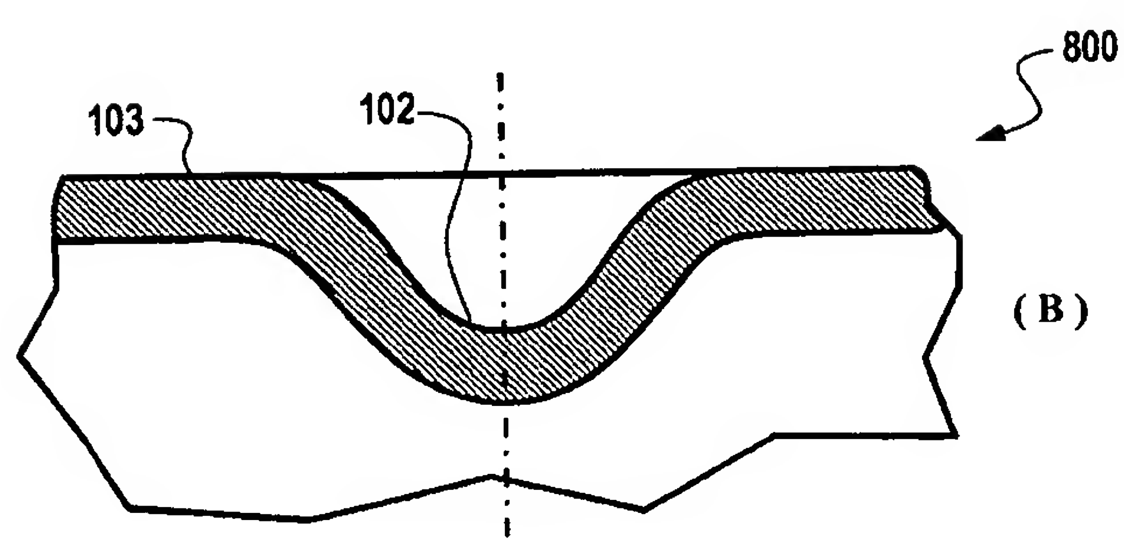


Fig. 8

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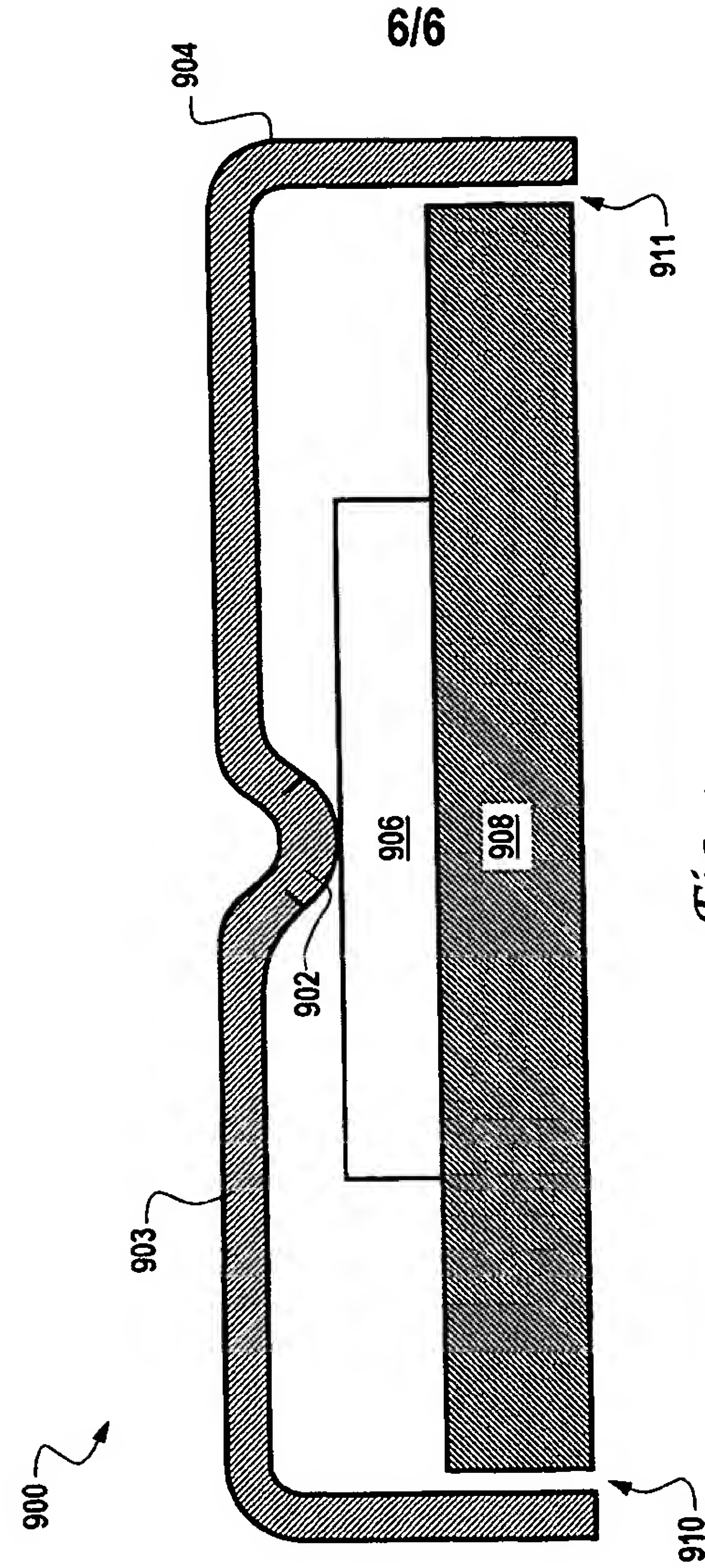

Fig. 9